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ABSTRACT

The problem of finding relevant material to answer a classroom need is the focus of this report. The Automated Instructional Resources Retrieval System (AIRR) is designed to assist teachers by storing information in a number of categories, including the following: media type, maturity level, length, producer or publisher, main curriculum area, language indicator, physical characteristics, title, author, narrative description, and index terms. The report presents: Why a Thesaurus; Format of Document Record; and Present Status. (See TM 001 363 for summary of project; for other related documents see TM 001 160, 364-371, 373-374.) (DB)

ED 063352

TM 001 372

INTENSIFICATION of the LEARNING PROCESS

A SERIES OF REPORTS
DESIGNED FOR CLASSROOM USE

REPORT NO. 8

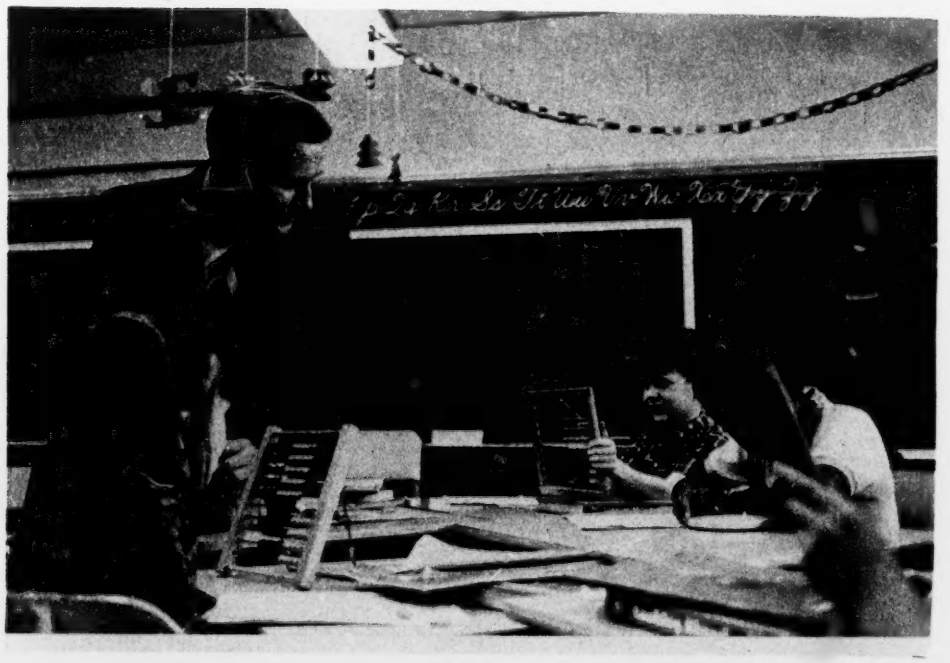
AUTOMATED INSTRUCTIONAL RESOURCES RETRIEVAL SYSTEM

AN ESEA TITLE III PROJECT

BUCKS COUNTY PUBLIC SCHOOLS
DIVISION OF CURRICULUM AND INSTRUCTION SERVICES

FEBRUARY, 1970

PERSONALIZING EDUCATIONAL PRESCRIPTIONS



AN ESEA TITLE III PROJECT
PRODUCED BY
BUCKS COUNTY PUBLIC SCHOOLS
COUNTY ADMINISTRATION BUILDING
DOYLESTOWN, PENNSYLVANIA 18901

PREFACE

Traditionally the Bucks County Schools have been in the forefront of promising educational practices. Therefore, it came as no surprise that the PEP Program was funded by the Federal Government; it was equally reassuring that the NATION'S SCHOOLS identified Bucks County's "Intensification of the Learning Process" as one of the twelve most innovative proposals in the Country.

While this Program may have used a new approach, educators the World over have been giving lip-service for years to the need for personalizing education. In a day and age when we are surrounded by mechanized inventions of all sorts, it becomes even more important for us to preserve the human element related to the teaching-learning process.

The primary goal of the PEP Program is the development of educational prescriptions--prescriptions which are the result of bringing diagnostic services and multi-media services into harmonious relationship as they focus on the individual needs of youth. The success of the venture is tied to our most important educational product--the child himself. With this focus we believe administrative and other supportive services can aid the teacher so that she can directly fit the educational diet to the needs of individual students.

Dr. George E. Raab
Superintendent
Bucks County Public Schools

REQUESTING THE REPORTS

The following reports reflect the views, principles, processes and products used in the dissemination of information about the Bucks County Project for the Intensification of the Learning Process. These reports may be used as a framework for schools developing personalized educational prescriptions for its primary elementary children.

There are ten individual reports. Rather than combine all into one, it was decided to disseminate individual reports. In this way, persons interested in any one individual report may request and receive it without going through a larger document.

Each report is described below by report number, title, and content summary:

Report No. 1 — Project Description

Describes the project goals, objectives, and team involved. Explains briefly the PEP approach to learning diagnosis and use of multi-level stimuli. Also includes a final summary report as well as changes in retrospect.

Report No. 2 — Research Findings

- Part A — Design to Measure the Effectiveness of Personalized Educational Prescriptions in a Pilot Second Grade Classroom
- Part B — Design to Measure the Effectiveness of Personalized Educational Prescriptions in the Second Year of a Pilot Study
- Part C — Analysis of Pre-Test and Post-Test Data

Report No. 2 cont'd.

Part I An Analysis of Data

Part II Homogeneity/Heterogeneity of Group Variances on Pre and Post Tests

Report No. 3

Gross Motor Performance Scale

- Introduction
- Test Administration
- Reliability of Test Items
- Interpretation of Test Scores
- Suggested Circuits for Improving Performance in Tested Areas
- Physical Education Curriculum Guide

Report No. 4

Diagnostic Instruments

- Learner State Check List
- Behavioral Objectives Evaluation Response Form

Report No. 5

Pupil Description Worksheet

- Introduction
- User's Manual
- The Worksheet
- Response Sheet
- Class Pupil Profile Grade 2
- Class Pupil Profile Grade 3
- Initial Personalized Educational Prescription
- Data Collection and Processing

Report No. 6

Educational Grouping Questionnaire

- A Classification of Children of Elementary School Age
- EGQ Manual
- EGQ Instrument
- Reports Provided by Computer Programs for the EGQ System
- Psychological Categories
- Sample Print-Out
- Recommendations for Future Development

Report No. 7 — Diagnostic Instruments

- Visual Performance Screening Test
- Observing the Learner
- Questionnaire - Parent

Report No. 8 — Automated Instructional Resources Retrieval System

- How to Use the AIRRS Thesaurus
- The Thesaurus

Report No. 8a — AIRRS Supplement

- Preface
- Why a Thesaurus
- Format of Document Record
- Present Status

Report No. 9 — Curriculum Resources Center

Report No. 10 — Prototype Curriculum Guides

- Mathematics
- Language Arts
- Science
- Social Studies

Each of the above reports are products related to the two objectives of the Intensification of the Learning Process, better known as Personalizing Educational Prescriptions (PEP) project.

1. The improvement of the diagnostic process with primary emphasis on the development of personalized educational prescriptions for all pupils.
2. The improvement and expansion of multi-media services for all pupils.

Bucks County Public Schools

Project for the

I N T E N S I F I C A T I O N O F T H E L E A R N I N G P R O C E S S

Report No. 8A

AIRRS SUPPLEMENT

ACKNOWLEDGEMENT

The work presented or reported herein was performed pursuant to a Grant from the U. S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.

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Present Status	27

PREFACE

All of us have had the frustrating experience of trying to remember the name of a book or film we used in class last year that would be "just perfect" for the unit we are to teach next week; we know it was about French farm life in the 18th century (or Indian ceremonials in the Southwest, or how to dress and act during an interview for a job, or whatever the topic is), that it was in color and ran for 8 minutes. We may even remember the producer and that it was suitable for the second grade, but its title eludes us, and without that we do not have access to the resource material. It is this dilemma to which the AIRR System addresses itself, the problem of finding relevant material to answer a classroom need, on the basis of clues concerning curriculum area, maturity level, characteristics and, particularly, subject content.

For every resource item that is available to teachers, the system will store information in a number of categories, including the following:

a. Media type: film, film-strip, book, chart, kit, set of study prints, etc.

b. Maturity level: kindergarten and primary, intermediate, secondary, college, etc.

c. Length.

d. Producer or publisher.

e. Main curriculum area.

f. Language indicator: whether bi-lingual or not, and what foreign language if any.

g. Physical characteristics: black and white or color, etc.

h. Title.

i. Author: for books primarily.

j. Narrative description: a brief description of the item with any pertinent information not contained above that would help the teacher in her choice.

k. Index terms: a maximum of ten words or phrases chosen from an authorized word list (called the Thesaurus) that describe the content of the item.

The strength of the AIRR System lies in two things:

a. Storage of information in the computer at the Data Processing Center in the Administration Building.

b. The use of the Thesaurus and a coordinate indexing system to provide the index terms describing the items.

Use of the computer provides more accurate and up-to-date files than a manual system and allows for faster access to a greater amount of information. Expansion of the files is easier and searching them can take place on the basis of many more criteria than is possible manually.

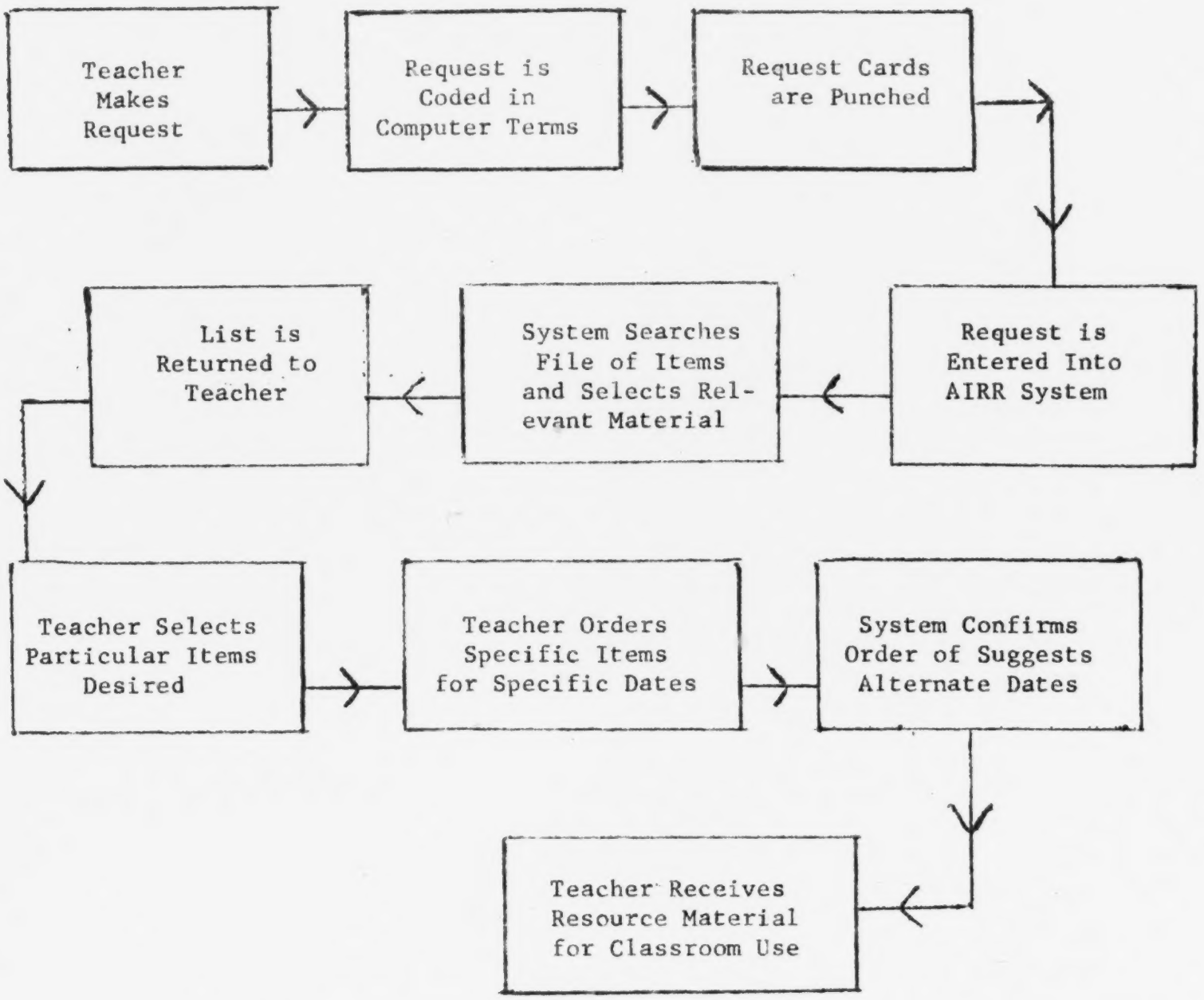
To explain the second point, in (b) above, we need to understand the difference between a coordinate indexing system and a hierarchical classification such as the Dewey Decimal or Library of Congress Classifications familiar to most of us. The latter attempt to construct mutually exclusive classes of information so as to provide the means by which an item may be exactly categorized; i.e., to put items into some logical order (on shelves, for example). They require one and only one place for classifying each individual item, providing many levels of specificity to accomplish this; they will not allow classification of an item in two or more equally good categories, however helpful, this might be to the user.

The index to the classification is a subject heading list which identifies every category, using as many sub-divisions of the headings as necessary. Thus Matthew Brady's pictorial history of the Civil War might (conceivably)

be listed under UNITED STATES - HISTORY - CIVIL WAR - BATTLEGROUNDS, PICTURES OF. This exactly classifies the book but allows it to be found (in the subject entries of the card catalog) by only the full heading. It would not necessarily appear under any of the sub-headings HISTORY, CIVIL WAR, BATTLEGROUNDS or PICTURES.

A coordinate indexing system, on the other hand, takes its name from the concept of co-ordinating a series of separate, equal-valued, individual descriptors that together will characterize an item. Its chief purpose is one of description rather than categorization; as such, it bears no relation to the physical order of the items but it affords greater access to their content. The Thesaurus (from a Greek word meaning "storehouse," or "treasure") is the list of the authorized descriptors, any one of which may be applied to an item, as appropriate. Since each individual term partially characterizes the item, each becomes a separate entry to the item, that is, a means of finding it when a search is conducted. Thus, Brady's book in a coordinate indexing system might be entered under each of the separate terms UNITED STATES, HISTORY, CIVIL WAR, BATTLEGROUNDS, PICTORIAL. The film described in the beginning of this article may be described by the index terms FRANCE, FARMS, 18th CENTURY, PEOPLE (GENERAL); it would be retrieved if any one of these terms was used alone to search the file. The computer becomes essential when we attempt to co-ordinate up to ten terms in a search request; trying to keep track mentally of all this information would be difficult, if not impossible, for a human user. The computer will be able to accept a set of terms, to search the file for every item that is described by all the requested terms, and to print out all recorded information for each item. The teacher may then make her selection of the items she wishes to use and follow usual procedures for obtaining them from the Curriculum Resources Center.

OPERATION OF SYSTEM


Teacher Makes Request
Request is Coded in Computer Terms
Request Cards are Punched
Request is Entered Into AIRR System
System Searches File of Items and Selects Relevant Material
List is Returned to Teacher
Teacher Selects Particular Items Desired
Teacher Orders Specific Items for Specific Dates
System Confirms Order of Suggests Alternate Dates
Teacher Receives Resource Material for Classroom Use

This is a very brief description of a complex and somewhat unfamiliar subject.

Ruth C. Baldwin
Systems Analyst, BURROUGHS CORPORATION
Consultant to the PEP Project

WHY A THESAURUS?

The question has been raised as to why we bother writing a thesaurus for our retrieval system (certainly a time-consuming and difficult task) instead of using some already-compiled list of standardized subject headings such as Sears. The question also implies (if not explicitly states) that we therefore would use the Dewey Decimal Classification scheme (for which Sears List of Subject Headings is intended) or the Library of Congress Classification System. This report will attempt to answer this question.

First, we must clarify our terminology; both Sears and our thesaurus are standardized vocabulary lists and hence are analogous in their respective areas. Subject heading lists are used with a hierarchical classification system; the corresponding term to describe the system that uses a thesaurus is co-ordinate indexing system. (We must be careful not to confuse the system with the vocabulary list used to describe documents classified by the system.) Because the system differ, the vocabulary list differ. Therefore, to understand the use of the thesaurus we must first explain the difference between a hierarchical classification and a co-ordinate indexing system. (Some pertinent definitions are given in the attached list.)

There have been many attempts at universal classification systems, the most well-known being the Dewey Decimal, the Library of Congress, the Universal Decimal, and the Colon Classifications. All of these attempt to construct mutually exclusive classes of information so as to provide the means by which a document may be categorized; i.e., may be put in the one

spot it fits most closely. To do this may require many sub-divisions of the subject area with corresponding sub-divisions of the subject heading used to describe it. The librarian uses headings, sub-headings, form divisions, geographic divisions and the like (according to very rigid and complex rules) to attach exactly the right subject heading to the book she is cataloging, since in general this is the only description of the book that will be available for use. I quote from the introduction to Sears (p.16):

> "Theoretically, there is no limit to the number of subject cards that could be made for one book, but practically such a policy would not only be expensive but inefficient for the user of the catalog. For many books, one subject heading will represent the book accurately; frequently, two are necessary; occasionally it requires three subject headings to do justice to the book; more than three should be considered very carefully - it may be due to one's own inability to identify precisely the single heading that would cover all the book's topics." (My underlining.)

It is this kind of purpose that necessarily results in lengthy sub-divided subject headings such as United States - History - Civil War - Biography or Agriculture - France - Bibliography. It also requires innumerable repetitions of the same topics so that we find as separate headings in the list:

Church
Church and Education
Church and Finance
Education
Education - Finance
Education - United States
Finance
Finance - United States
Negroes
Negroes - Education
Negroes - Religion
Religion
Religious Education
United States
United States - Religion

These fifteen headings are made up of the six separate terms:

Church
Education
Finance
Negroes
Religion or Religious
United States

The problem may be compounded when we realize that everywhere the heading United States appears, we could substitute the name of any geographical sub-division so that we get:

Education - England
Education - France
Education - Germany, etc.

or

England - Religion
France - Religion
Germany - Religion, etc.

There is the problem of order: we sub-divide the term Education by the geographical place name but we sub-divide the geographical place name by the term Religion. There is also the problem of adjective form vs. noun form (Spanish vs. Spain) or the problem of singular vs. plural (Church vs. Churches) each of which has its specific semantic aspect. Some problems may be answered only arbitrarily: a book on Chemical Physics is classified under Physics, even thought it may be of more use to a chemist. Many such problems are resolved differently in different libraries according to the purpose or "slant" of the library itself.

Making and using a hierarchical classification scheme is far from easy because the basic purpose of such a scheme is to have "a place for everything and put everything in its place." This involves problems of:

a. specificity - depth of coverage

b. range - breadth of coverage

c. expansion - additions of entirely new topics that may not fit into the old structure, or changes in terminology in old topics, because of advances in knowledge or evolution of viewpoints.

The first two of these are self-evident. To illustrate the third one, it is necessary only to consider the introduction of the whole gamut of aerospace science into the Dewey Decimal Classification or the changes in the fields of medicine and biochemistry with the discovery of antibiotics. This problem of expansion (it is sometimes called "hospitality") is perhaps one of the chief snags in designing a classification system.

The co-ordinate indexing system takes its name from the concept of co-ordinating a series of separate, equal-valued, individual descriptors that together will characterize a document. Its chief purpose is one of description rather than categorization. As few as three or four index terms may be used, or as many as 300, but a common average is probably about 12-15. (This is in contrast to the 1-3 subject headings assigned in the classification system.) The index terms are generally one word, single concept, usually in the noun form, occasionally annotated, but never sub-divided. Thus, the six index terms

Churches
Education
Finance
Negroes
Religion
United States

could be combined to cover any of the fifteen headings used as a previous illustration:

Churches; Education
Churches; Finance
Education; Finance
Education; United States
etc.

Notice that (a) order of these terms is not important since each is considered to be of equal weight (co-ordinated, not subordinated) and (b) the combined strings do not themselves appear in the vocabulary list for the co-ordinated indexing system while they do appear in the subject heading list.

Subject headings with even further sub-divisions as in the previous example United States - History - Civil War - Biography can be paralleled in the co-ordinate indexing system by the concatenation of descriptors: Biography; Civil War; History; United States (order is usually alphabetical for convenience).

The question will surely arise as to the benefits to be gained by using

Biography Civil War History United States	vs.	United States - History - Civil War - Biography

since each seems equally long and equally explicit. There are four possible advantages of the co-ordinate indexing system over the hierarchical classification system:

a. A simplified vocabulary list may result since only individual terms are listed and not all combinations; this does not necesarily result in a smaller list since with the same number of entries, coverage may be broader or deeper. Both systems use cross-referencing extensively.

b. Expansion of the system is easier to provide since the addition of new terms to a thesaurus is easier than fitting them into a rigidly classified structure. It should be noted that this is not an overwhelming argument in favor of the co-ordinate indexing system; changes in terminology or changes in levels of specificity may still result in the necessity of re-indexing old material to keep it in accord with new concepts. This is equally true in both systems.

c. It is possible to describe a document more exactly by the use of 12-15 index terms than it is to find one subject heading (however sub-divided) that will do the same thing as completely. This is because of the purpose of the co-ordinate indexing system to describe rather than categorize.

d. Probably the most important advantage of the co-ordinate indexing system is the number of access points afforded by the descriptors. Since each descriptor is essentially an individual term that partially characterizes the document in question, each becomes a separate entry to the document (i.e., a means of finding it) when a search is conducted. This is not true of the separate sub-divisions of a subject heading.

As an illustration of these last two points, consider the descriptions of the following three films as found in the 1967 RIMC Catalog. For each

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I have given the subject heading from Sears that most closely fits the description as given (I tried to be as objective and exact as was possible) and the index terms I had assigned from the first draft of our thesaurus.

1. (#5323, p.78) "Human Reproduction. Here is a factual film on the human reproductive systems and on the process of normal human birth. Models and animated drawings are used to describe the anatomy and physiology of the reproductive organs of men and women. The film stresses the biological normalcy of reproduction and the importance of clear, objective familiarity with these facts as preparation for successful marriage and parenthood."

   A. Sears: The closest I could come to this was REPRODUCTION. Sub-division by HUMAN is not allowed and references from HUMAN BODY are only to ANATOMY and PHYSIOLOGY which seemed too general here.

   B. Thesaurus: I assigned REPRODUCTION; ANATOMY, MALE; FEMALE; LIFE SCIENCE; MARRIAGE, each one of which becomes an access point to this film; i.e., it would be returned as an answer if anyone of these descriptors is used in a query. Note the use of descriptors MALE and FEMALE. Presence of only one of these might be a useful restriction in other cases.

2. (#10121, p.86) "Research by Rocket. The exploration of the upper atmosphere by instruments carried aloft by rockets is explained. The history of man's attempts to reach out into the higher atmosphere is portrayed and the variety of modern rocket vehicles including their principles of operation, is shown. Significant discoveries relating to the atmosphere, ionosphere, the earth's magnetic field, cosmic rays, the aurora, and radiations from the sun are examined."

   A. Sears: ATMOSPHERE, UPPER - RESEARCH was chosen from Sears. There might be a cross-reference to ROCKETRY or ROCKETS (AERONAUTICS) if a second subject heading is chosen. Note that the sub-division RESEARCH is not an access point; i.e., this film would not be retrieved if we looked it up under RESEARCH.

   B. Thesaurus: ROCKETS; RESEARCH; EXPLORATION; ASTRONOMY; AEROSPACE SCIENCE are chosen. Our thesaurus has AIR but not ATMOSPHERE so this might be added. Note the availability of generic terms (ASTRONOMY and AEROSPACE SCIENCE) as well as the peripheral term EXPLORATION.

3. (#5041, p.147) "JOHN MARSHALL. A portrait of the founder of American constitutional law; reveals predisposing experiences of Marshall's boyhood; depicts his role in the American Revolution; traces developments which drew him into national politics and led to his appointment as Chief Justice of the Supreme Court. Reveals court decisions through which Marshall established the Supreme Court as the highest authority in determining the constitutionality of American legislation."

   A. Sears: UNITED STATES - CONSTITUTIONAL LAW - BIOGRAPHY, with an added subject heading for JOHN MARSHALL. This seemed inadequate to me but was the closest I could come. Note that neither

CONSTITUTIONAL LAW nor BIOGRAPHY is an access point for this film.

B. Thesaurus: UNITED STATES; CIVICS AND GOVERNMENT; LAW; COURTS; AMERICAN REVOLUTION; HISTORY; BIOGRAPHY; PEOPLE (SPECIFIC) were chosen. The last (generic) term is added to cover the fact that this film is about one specific individual but his name does not appear as a separate index term (since there are not enough items about Marshall to warrant this).

Now, my exact choice of subject headings and/or descriptors may be argued; indexers seldom agree. But the basic principles remain: the co-ordinate index terms offer more accessibility to the document and in some respects more possibility of retrieval by generic terms as well as by specific ones.

This brief suggestion of the differences between the hierarchical classification system and the co-ordinate indexing system is not intended to suggest that the latter is always better or that the former does not have many uses. It all goes back to the purpose of each. The classification system is intended for putting items (say, books) into some logical order which can then be copied by their physical order. This makes browsing convenient as most related topics will be found together. For the storage of knowledge it is ideal. The co-ordinate indexing system, on the other hand, bears no relation to the physical order of the elements of the system: ordering by a simple accession number is probably the best from the retrieval aspect but certainly does not facilitate browsing. However, the documents will be better described by this method; in particular, information of secondary importance or from differing viewpoints will not be lost. To close I will quote C. Schultz in an unpublished paper on documentation (November 1965):

> "One of the new problems of libraries is the increased demand for finding documents when they are wanted by scientists. Until now the librarians' main concern has been with putting material away logically (to the librarian) according to where it belongs in the classification scheme. Little if any thought is given to the wide gulf which the documentalists say exists between storing material logically, according to the perspective from which it was written, and finding it again from whatever perspective a searcher might have."

If you have ever hunted desperately for a book whose author and title you can't remember but which you are certain contains, in one short chapter, exactly the information you desire, you will understand what we are trying to do in the AIRR System.

Ruth C. Baldwin
Systems Analyst, BURROUGHS CORPORATION
Consultant to the PEP Project

FORMAT OF DOCUMENT RECORD

The record will consist of three parts:

a. a fixed field part where every item of information will be represented by a fixed number of characters, usually coded;

b. a variable field part where items will vary in length from record to record up to some maximum limit;

c. a key field part where an index is given for the length of each variable field.

In general, each fixed field, such as the copyright year, maturity level, media type, curriculum area, etc., will be a "searchable" field, i.e., it may be accessed by the user of the system in a request for information. This is also true of the coded index terms even though the length of the total field is variable. The other variable fields such as title and author are for display only in response to a request. For example, a teacher may not ask for a specific author or title but she may ask for specific index terms.

Note that the following fields 3 and 4 form a unique identification for every resource item.

Fixed Fields

Information Item	No. of Characters	Remarks
1. Media code	2 alphabetic	Standardized by DAV1. See attached list A.
2. Storage code	1 numeric	Standardized by DAV1. See list B.
3. Year of accession	2 numeric	Last 2 digits of year.
4. Accession number	4 numeric	A running sequence number over all media; reset to 1 each year.
5. Year of copyright	2 numeric	Last 2 digits of year
6. Blanks	25	Reserved in DAV1 code for short title. We do not want it but keep the space open to be compatible.
7. Maturity level	3 alphabetic	Codes chosen from list D; the most suitable level is indicated by middle letter of the three.
8. Length	3 numeric	Length of time of playing a record or showing a film; number of pages in a book, items in a collection, etc.
9. Producer/publisher	6 alphabetic	These are standardized codes developed by the LC and NICEM. Examples are included in list C.
10. Primary curriculum area	2 alphabetic	Fifteen mnemonic codes. See attached list E.
11. Bi-lingual indicator	1 numeric	If a book or film is in two languages, this code is 1; otherwise, 0. One language is assumed to be English.
12. Foreign language	2 alphabetic	This is a mnemonic code to indicate what the foreign language is, whether it is the only one, or one of two. See list F.

13.	Series designator	3 numeric	Sub-code under the media code (item 1), i.e., a book series under BS or a film series under MP. The same number might occur in both but the media code would make them unique. There need be no connection between BS123 and MP123. (Codes not yet established.)
14.	Adjunct material	1 numeric	Code = 1 if supplementary material (reviews, critiques, suggestions for use, etc.) is available; 2 if teacher's edition is available; 3 if both are; 0 if neither.
15.	Physical characteristics	3 numeric	Primarily for audio or video materials; designates playback speed, stereo or monaural sound reproduction, color, etc. See list G. For books this may be the Botel readability level or an interest level (rather than grade level).

(Note: above fields 1-4, 7-9, and 15 correspond to the Standardized Coding of Educational Media suggested by DAVI. Content is mostly the same; format and postion are identical.)

16.	RIMC subject code	6 numeric	Three 2-digit codes representing a 3-level hierarchical classification of subject area.
17.	Instructional milieu	3 numeric	Three separate codes for group situation, instruction area, and structure qualification. See list H.
18.	Funds used to pay for resource item	1 numeric	Code =1 if material available only to public schools (because bought with ESEA funds); = 0 if available to any public, private, or parochial school.

19.	Reference/review	1 numeric	Code = 1 if material is on loan and available only for reference or review in LRL; = 0 otherwise.
20.	Location of material	6 alphabetic	Where material can be found if not at LRL. Codes have not been established.

(Note: Items 18-20 may not be in this file in the final decision.)

Keys to Variable Fields

21.	Number of codes index terms	2 numeric	Key to length of index field.
22.	Length of title in segments	1 numeric	Key to length of title field.
23.	Length of author entry in segments	1 numeric	Key to length of author field.
24.	Length of narrative description in segments	1 numeric	Key to length of narrative descriptive field.
25.	Length of uncoded index terms entry in segments	1 numeric	Key to English version of index terms.

(Note: All segments have 55 characters.)

Variable Fields

26.	Coded index terms	alphanumeric	Each term is 4 digits and there is a maximum of 15 terms.
27.	Title	alphabetic	Maximum of 2 segments for title.

28. Author entry	alphabetic	Maximum of 1 segment allowed in the entry. More than one author may be given up to maximum length of field. Names are in normal order (John A. Smith) since this field is not for searching or sorting.
29. Narrative description	alphabetic	Maximum of 8 segments (440 characters). May contain any statement that would assist user in understanding content, format, etc.
30. Index terms in English	alphabetic	Approximate maximum is 6 segments if all 15 terms are used. This field is for display only.

Record Size	Maximum	Average
Fixed fields	77	77
Keys to variable fields	6	6
Variable fields	995	464
Total	1078	547

* Estimates of 24, 55, 0, 275, 110 for fields 26-30 respectively. These are conservative and therefore probably high.

List A: TABLE I

IDENTIFICATION NUMBER: MEDIA CODE

CLASS	MEDIUM	CODE	COMMENTS
AUDIO RECORDS	Discs	RD	
	Tapes	RT	
	Card sets (Magnetic striped flashcards)	RC	
MOTION RECORDS	Motion picture films (including Kinescopes)	MP	Kinescopes identified in catalog.
	Motion picture films - cartridge	MC	
	- loops	ML	
	Video recordings (tape, disc, etc.)	MV	
STILL FILMS	Microfilms (reels)	FM	
	Microfiche, Aperture cards	FF	Jacketed film cards
	Filmstrips	FS	Filmslips (rigid format)
TRANSPARENT MATERIALS	Slides (all sizes including microscope)	TS	Stereoscopic slides
	Transparencies (for overhead projection)	TR	Transparent objects
FLAT MATERIALS	Study Prints	PS	Flash Card Sets
	Art Prints or Reproductions (opaque)	PA	
	Display Board materials (sets)	PD	(Magnetic & fabric)
	Charts (wall charts, flip charts, etc.)	PC	Scrolls Maps
	Micro cards (opaque)	PM	
BOOKS	Programmed Instruction texts	BP	
	Books (circulate as single volumes)	BK	Periodicals
	Booklets, Brochures, Newspaper clippings	BB	Articles, Reports
	Study Guides - Teacher's Manuals	BG	Catalogs, Professional texts
	Sets, series, (circulate as sets)	BS	Textbooks, Encyclopedias
DIMENSIONAL MATERIALS	Dioramas	DD	
	Exhibits (displays)	DE	
	Models (mock-ups) Puppets, Dolls	DM	Planetariums, Globes
	Specimens - Samples (realia collections)	DS	Artifacts, Objects
MULTI-MEDIA KITS	Kits - a mixture, program, or system of units representing various media	KT	Slide-tape sets, Filmstrip-disc sets
	Programmed Instruction (machine format)	KP	Computer Aided Instruction
	Laboratory Kits	KL	Boxed materials for discovery, games
OTHER	Unassigned (for expansion to accept a new class of medium)	XX	Equipment? Miscellaneous?

List B: TABLE II

IDENTIFICATION NUMBER: STORAGE CODE

MEDIUM	DIMENSION		STORAGE CODE*	EXAMPLES
Audio Records				RT7...is a recording on a 7 inch reel of audio tape
RT	Tape or disc diameters	3 inch	3	
RD		4 inch	4	
etc.		5 inch	5	
		7 inch	7	RD2...is an audio recording on a 12 inch disc
		10 inch	1	
		12 inch	2	
		16 inch	6	
Motion Records	8mm and Super 8mm	short	8	MC8...a short (4min.) 8mm single concept film in a cartridge
		long	9	
MP	16mm 1 reel	(400 feet)	1	MP8...ashort 8mm film
MC	16mm 2 reel	(800 feet)	2	
MV	16mm 3 reel	(1200 feet)	3	MP4...a 16mm film in a 1600 ft. can
etc.	16mm 4 reel	(1600 feet)	4	
	35mm		5	MV4...a videotape recording on 1/4 inch tape
	70mm		7	
	Tape widths 1/4 inch		4	
	3/4 inch		3	
	1 inch		1	
	2 inch		2	
Still Films				
FM	Microfilm reels		1	FM1...microfilm on a reel
FF	Microfiche		2	FS5...35mm filmstrip
FS	Filmstrips 35mm		5	
Transparent Pictures				
TS	Stereoscopic - slide pairs		1	TS0...is a View-Master "reel"
TO	- discs		0	
	Microscopic slides		5	TO8...is a transparent slide rule for overhead projection
	2 x 2 slides		2	
	2 1/4 x 2 1/4 slides		3	
	3 1/4 x 4		4	
	7 x 10		7	
	Flat transparent materials		8	
	Dimensional "	"	9	
ETC.	ETC.		ETC.	ETC.

*NOTE...These numbers are a recommendation only. This code's exact content is a matter for each local materials center to establish for internal storage control. The numbers are presented here because they are part of the identification number.

e.g. FS5-64-009103

List C: Sample Producer/Publisher Codes

Producers: from NICEM

ABCTV	American Broadcasting Co., TV
BRYAN	Julien Bryan
COLLRD	Jarvis Couillard Associates
DISNEY	Walt Disney Productions
FA	Film Associates
HRAW	Holt, Rinehart and Winston
YUP	Yale University Press

Publishers: from the MARC Project, Library of Congress

Name	Place	
AAGE	AACA	Government Printer, Canberra, Australia
AB	MSBO	Allyn and Bacon, Inc., Boston, Mass.
ACC	NYNY	Appleton Cnetury Crafts, N.Y.
GINN	MSBO	Ginn and Co., Boston, Mass.

In these codes, the name has four letters in place of the six letters from the producers' codes so it is suggested that two letters from the place code be added. In the place code, the first two letters represent the state or country and the last two, the city.

List D: Maturity Level Codes

Pre-school, nursery	N
Kindergarten and primary (K-3)	P
Intermediate (4-6)	I
Secondary 1 (7, 8)	J
Secondary 2 (9, 10)	S
Secondary 3(11, 12)	H
College	C
Adult education	A
Teacher training - Professional content	T
General - universal application	GEN
Exceptional children - special education	X

It is suggested that three letters be used to show range of maturity with the most suitable in the middle. Thus PIJ, PII, and III would all indicate recommended Intermediate use with the first example having broader application than the second and the third being restricted to that level. Universal application would use only the three letter code GEN (which still has a unique middle letter).

List E: Curriculum Area Codes

AR	Art
BE	Business Education
DT	Driver Training
FL	Foreign Languages
HE	Health Education
HO	Home Economics
HU	Humanities
IA	Industrial Arts
LA	Language Arts and English
MA	Mathematics
MU	Music
PE	Physical Education
SC	Science
SS	Social Studies
VT	Vocational - Technical

List F: Foreign Language

Seven are suggested specifically as being most necessary:

French	FR
German	GE
Hebrew	HB
Italian	IT
Latin	LA
Russian	RU
Spanish	SP
Other	XX

List G:

DESCRIPTIVE ELEMENT CODES: PHYSICAL SPECIFICATION CODES

These descriptive elements are not common to all media; they are specific to two broad classes of media (video materials, and audio materials) and the physical nature of the media within these classes. Again, we must caution users that these elements when coded must be assigned to fixed fields (columns, positions) for correct decoding or processing either manually or mechanically.

For Audio Materials

A three-character field should be provided to indicate physical specification of audio materials. The first of the three characters would be a numberic code to designate playback speeds.

discs	8 1/3 rpm	8
	16 2/3 rpm	1
	33 1/3 rpm	3
	45 rpm	4
	78 rpm	7
tapes	15/16 ips	0
	1 7/8 ips	1
	3 3/4 ips	3
	7 1/2 ips	7
	15 ips	5
	30 ips	2
	60 ips	4
	120 ips	8

The second character would be an alphabetic code to indicate stereophonic or monaural sound reproduction. The third character would be a numeric code to indicate the tape tracks involved in the case of tape recordings; it would be blank or dashed (-) for disc/recordings.

	CODE	TAPE TRACKS INVOLVED	
Stereophonic	S	1/8 track or 8 tracks	8
Monaural	M	1/4 track or 4 tracks	4
		1/2 track or 2 tracks	2
		full track or Single track	1

For example, within the field for physical specification, which has a three-character limit, an entry such as -7M - would indicate that it was a disc since no tracks are involved, that it has a playback speed of 78 rpm, and that it is a monaural recording.

List G (continued)

For Video Materials

A three- character field should be provided to indicate physical specifications for video materials. The first character would be an alphabetic code to designate the physical nature of any audio element incorporated in the medium or accompanying the item.

		AUDIO CODE
Incorporated	Magnetic sound track	M
	Photographic (Optical) track	P
	Captions (Subtitles)	C
	No narration (Silent or only musical background)	- or U*
Accompanying	Disc (Record)	D
	Script (Guide)	S
	Taped script	T
	No accompanying verbal material	-

* For visual productions with no narration an optional use of "U" (for Universal Application) is provided since such materials have a wider subject and level application once commentary restrictions are removed. It is also realized that many motion records could have wider application if the incorporated or accompanying narration was "turned off" (and the children or teacher provided an alternative commentary) but this cannot be coded since it goes beyond the physical nature of the material to the method of presentation.

The second and third characters would be an alphabetic code to designate the physical nature of the image:

(1) to indicate whether it is positive or negative (as in the case of microfilms)
(2) to indicate whether it is colored, or monochromatic, or
(3) to indicate if the image requires regular or anamorphic projection

	IMAGE CODE
BLACK/WHITE (SEPIA)	B
COLOR	C
POSITIVE	P
NEGATIVE	N
ANAMORPHIC (cinemascope)	A

For example, within the three-character field for physical specifications an entry such as: C-C for a filmstrip would indicate that the audio element was present in the form of captions to be read and that the image was in color. The dash was a space holder and could be interpreted as indicating regular projection. A -- B entry would indicate video material with no audio element and a black and white image.

Note: Usually only one of these code letters is needed for each item. Most materials that are negative are also black and white and most that are for anamorphic projection are positive and in color. These code letters may be used in pairs if necessary, such as BN for a negative microfilm in black/white, or PC for a positive filmstrip in color, however most applications will need only one code letter with other aspects of the image being understood.

List H: Instructional Milieu: One 3-digit Field

A. Group Situation

1. Suitable for large group (50 or more)
2. Best for classroom size (20-30)
3. May be used for class or large group
4. Best used in small group (3-5)
5. Best in small group but suitable for class size
6. Must be used by individual
7. Best for individual or small group

B. Instruction area

1. In classroom
2. In school library or IMC
3. In school but not (1) or (2)
4. Outside of school

C. Structure qualification

1. Structured activity
2. Unstructured activity
3. Not specifically either

THE PRESENT STATUS

The status is as follows:

1. AIRRS - 1:

   Testing is completed on the basic program (which sets up the tape file of resource data) and the Document Record tape file has been created. The program is being modified to provide file correction capabilities (this is in lieu of a separate correction program). As data is coded and keypunched, AIRRS - 1 is used to add it to the file.

2. AIRRS - 2:

   In production. This tape provides an edited printout of the file in a form that allows data processing personnel to correct errors and update the file that was created by AIRRS - 1.

3. AIRRS - 3:

   The printout section of this program (that prints the file in a display format suitable for the user) is in the testing stage. The search portion has not been written (see below).

The search program logic has been under discussion and is in the process of revision. At first a design was developed that included a fairly extensive type of Boolean logic involving AND, OR, and NOT options. A simple example of this would be the question:

> Is there any material in the file that is about the Indians in North or South America?

This would be expressed in logical form as:

> Indians AND (North America OR South America).

Other questions might be even more complex, involving nested parentheses, negatives, and many terms connected by the AND's and OR's. Flow charts and file formats were designed for this type of search program but it was finally abandoned for the following reasons:

1. Complete Boolean logic is not easy for non-mathematical teachers to use. The confusion of trying to use it would probably offset any advantages arising from the sophistication of the method.

2. The COBOL language does not lend itself to the kinds of data manipulation required to handle the complex logic structure.

3. The simpler method proposed below can be implemented more easily in COBOL on the H-200 and can accomplish the main purpose of retrieval nearly as well.

4. In a prototype system such as the one we are setting up, it is hard to justify the extra effort required in programming and in teacher-training just in the interests of elegance of design.

The method proposed, that will be implemented, will provide for the teacher's listing as many terms as fit her subject and giving a number of "hits" she will accept, from one to the total number listed. In essence, this is providing just AND type logic and specifying how many of the terms will be considered sufficient to satisfy the request. For example, a query may list the terms

MUSIC
GRAPHIC ARTS
DANCING
ARTS
OPERA

and may specify that any record having any three of these will be acceptable. OR type logic may be handled by making two (or more) searches and using the results of all. For instance, the example used to illustrate the previous method may be handled as two lists

INDIANS
NORTH AMERICA

and

INDIANS
SOUTH AMERICA

were the acceptable hit level in both cases is two. This method will be far easier to implement in COBOL and easier to explain to teachers.

The trial indexing of the guidance section gave very interesting results. Six people indexed (individually) the 56 films. They were asked to choose any

appropriate terms that they thought were suggested by the content of the film description. The individual results were compiled in a matrix format showing horizontally terms chosen for each film and vertically terms chosen by each indexer. The only consistent aspect of the list was the complete inconsistency between indexers and between films. Since no one was allowed to use the thesaurus as a guide, choice of words and phrases was completely unrestricted. The complete list included some 248 different terms. Of these, 162 were covered more or less by either authorized or referred terms from the thesaurus, some exactly and some by synonyms or variant forms. Examples of these are Maturity, Emotional Maturity, Social Maturity, Maturity (Social) and Maturity (Emotional): all covered by Maturity; or Class Report and Reporting Skills: covered by REPORTING. Thus, approximately 5% were discarded completely as being inappropriate (these included Administration and Other, Any Class Using the Library, etc.) leaving only 74 terms that could be considered as possible new entires; even these contained duplicates or near duplicates (such as Fear, Fears, and Phobias or Memory and Memory Skills) which left only a relative few that would be useful.

Just to illustrate the difficulty of the indexing process, consider the facts that:

1. The number of terms assigned to any one film by one indexer ranged from none to nine.

2. The number of terms used for any one film by all indexers together ranged from 10 to 28.

3. The number of <u>different</u> terms used for any one film by all indexers together ranged from 8 to 20. These occured in the same spots as the limits given in (2)!

4. The degree of overlap; i.e., any term chosen by more than one indexer, ranged from none (12 out of 12 terms were different) to eight (20 out of 28 terms were different).

5. The total number of terms assigned to all films by any one indexer ranged from 73 to 276.

6. The total number of different terms used by any one indexer ranged from 27 to 114, corresponding to the same indexers represented in (5).

7. Not surprisingly, the term Guidance appeared most often, 108 times.

There could be many more fascinating statistics culled from these results; these few will serve to indicate how delicate an art is indexing and how fraught with inconsistency and ambiguity. In the appendix are given the descriptions of two of the films and the terms chosen for them.

No. 5160 ACT YOUR AGE

Some of the more common types of infantile reactions - temper, weeping, inability to 'take a joke' as well as other forms of emotional immaturity are illustrated. The basic reasons for the continuance of these common signs of emotion into adolescence are shown. The film offers a method of self-evaluation to help overcome the social handicaps that come with inability to grow up.

1	2	3	4	5	6
Emotions Maturity Growing up Adolescence Self-Evaluation	Attitudes Values Behavior Social Living Child Development Maturity	Teacher Education Guidance Health	Guidance Individual Personality Attitudes Mental Health Personality Development Adjustment Behavior Adolescence	Psychology Mental Health	Psychology Mental Health Guidance Growth & Development

No. 59 FACTS ABOUT FILMS

Shows the harmful effects on 16mm film of improper projector cleaning, film threading, film rewinding, and the placement of films in cans. Points out the physical qualities of 16mm film which make it susceptible to damage; and demonstrates the ways that film may be protected.

1	2	3	4	5	6
NONE	Care of Audio-Visual Equipment Film (care) Movies Projectors	Teacher Education Library	Industrial Arts Visual Aids Film Projection	Clubs Extra Curricular Activities	Audio-Visual

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